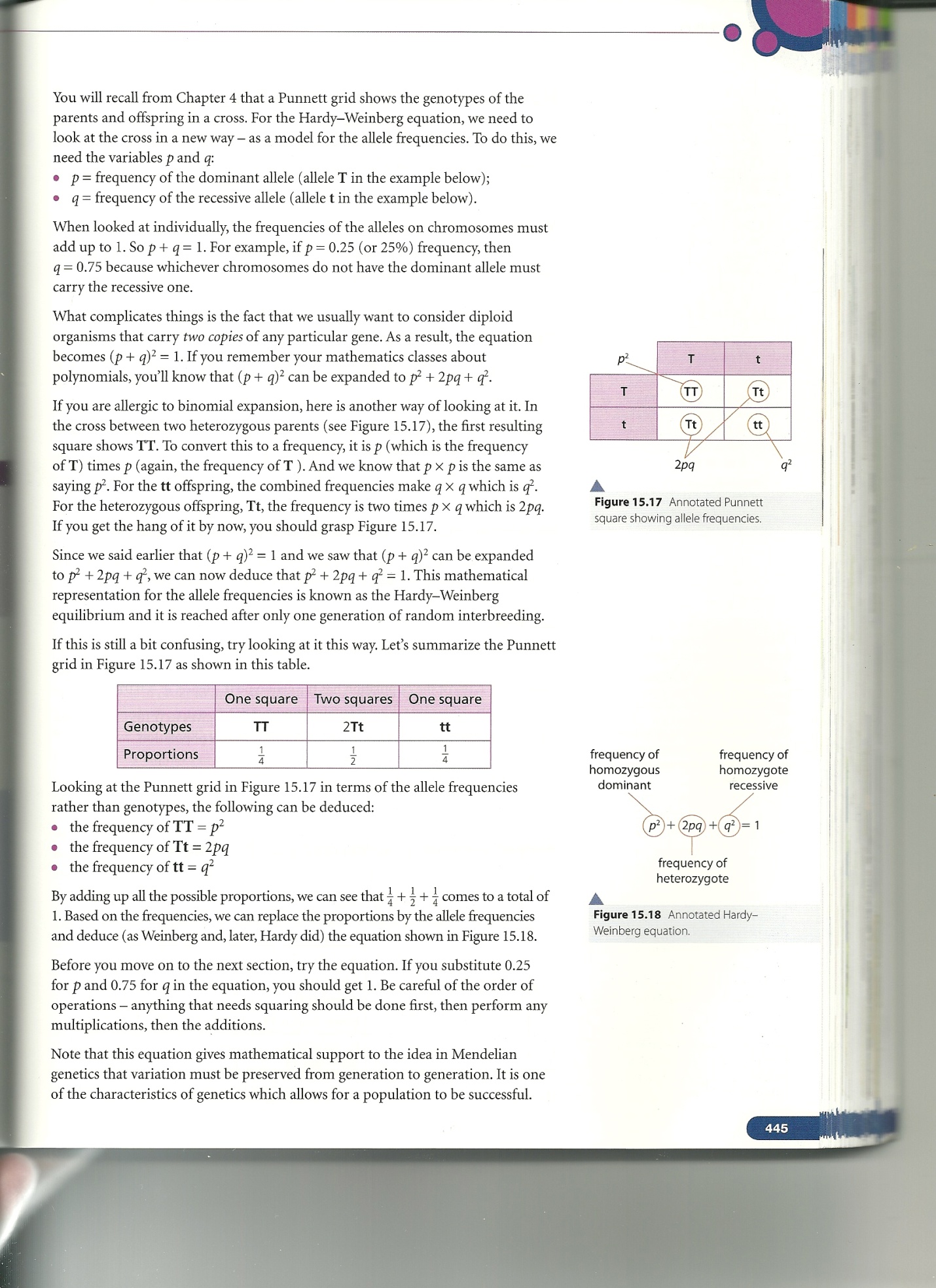
**The hardy- Weinberg principle**

The Hardy- Weinberg equation

In order to calculate the frequencies of alleles, genotypes or phenotypes within a population, the Hary- Weinberg equation is needed. This is useful in determining how fast a population is changing or in predicting the outcome of mating or crosses. To understand how it is used, it is best to start with grasp of how it was derived.



**Example 1** – Calculating allele frequency

Consider a disease caused by a recessive allele t. Let us say that the predicted frequency of this allele in the population being studied is 10%. Calculate the frequency of the healthy allele in the population.

Solution for example 1

From the information given, we know that q is 0.10 and since the proportions of p and q must be always add up to 1, we can say that p=1-q. So p must be 0.90, which means that in the gene pool, 90% of the alleles are T.

Remember that this does not mean 90% of the population is healthy because we are calculating an allele frequency, not a genotype frequency.

**SOLVE the following problems.**

**Example 2**—calculating allele frequency

In a study of 989 members of the population from example 1, it was found that 11 people had the disease. Calculate the frequency of the recessive allele t.

**Example 3** – Calculating genotype frequency

Using the information from example 1:

1. Fill out the table below;

|  |  |  |  |
| --- | --- | --- | --- |
| Allele frequency | Recessive t | q |  |
|  | Dominant T | P |  |
| Genotype frequencies | Homozygous recessive tt | q2 |  |
|  | Heterozygous Tt | 2pq |  |
|  | Homozygous dominant TT | p2 |  |

1. Calculate the frequency of carriers in 500 members of the population.

**Example 4** Calculating phenotype frequency

Using the information from the table in example 3, calculate the number of people in 500 members of the population who do not suffer from the disease.

*Once equations has been used, it is possible to perform a statistical test to see if the predicted values truly correspond to the values obtained by observing phenotypes in the offspring of a population.*

**#1** -- A population starts out with only AA and aa individuals. Deduce with reason how many generations are necessary to reach the hardy- Weinberg equilibrium.

**#2** -- In a population of 278 mice, 250 are black and 28 are brown. The alleles are B= black and b= brown. Fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Allele frequency | Recessive b | q |  |
|  | Dominant B | P |  |
| Genotype frequencies | Homozygous recessive bb | q2 |  |
|  | Heterozygous Bb | 2pq |  |
|  | Homozygous dominant BB | p2 |  |

**#3** -- Explain why the hardy- Weinberg equilibrium would not be attained if the brown mice preferred to mate only with other brown mice.